PROCEEDINGS

OF THE

AMERICAN PHILOSOPHICAL SOCIETY.

VOL. 1. SEPTEMBER & OCTOBER, 1839. No. 8.

Stated Meeting, September 20.

Present, twenty-eight members.

Mr. DU PONCEAU, President, in the Chair.

The following donations were received:—

FOR THE LIBRARY.

Mémoires couronnés par l'Académie Royale des Sciences et Belles Lettres de Bruxelles. Vol. XIV. Part I. Brussels, 1838.—*From the Academy.*

Nouveaux Mémoires de l'Académie Royale des Sciences et Belles Lettres de Bruxelles. Vol. XI. Brussels, 1838.—*From the same.*

Annuaire de l'Académie Royale des Sciences et Belles Lettres de Bruxelles. Cinquième Année. Brussels, 1839.—*From the same.*

Bulletin de l'Académie Royale des Sciences et Belles Lettres de Bruxelles. Nos. 9 to 12. Brussels, 1838.—*From the same.*

Philosophical Transactions of the Royal Society of London, for the year 1838. Two parts. London, 1838.—*From the Society.*

Proceedings of the Royal Society of London. Nos. 32 to 36 inclusive, and No. 38.—*From the same.*

List of the Council, Scientific Committees, Fellows, and Foreign Members, of the Royal Society of London, 1839.—*From the same.*

Astronomical Observations made at the Royal Observatory, Greenwich, in the year 1837. London, 1838.—*From the same.*

Appendix to the Greenwich Observations, 1837. London, 1838.—*From the same.*

The Journal of the Royal Geographical Society of London. Vol. IX. Part II. London, 1839.—*From the Society.*

Transactions of the Royal Geological Society of Cornwall. Vols. I. to IV., inclusive. London, 1818, and Penzance, 1822, 1828, and 1832.—*From the Society.*

Proceedings of the Botanical Society of London. London, 1839.—*From the Society.*

Bulletin de la Société Impériale des Naturalistes de Moscou. No. IV. Moscow, 1837.—*From the Society.*

Catalogue of the officers and students of the Medical Institute of the City of Louisville. Louisville, 1839.—*From Dr. C. W. Short.*

Periodical Accounts relating to the Missions of the Church of the United Brethren, established among the Heathen. Vol. XIV. Nos. 156 to 160 inclusive. London, 1837.—*From Mr. James J. Barclay.*

The twentieth Report of the Committee of the London Association, in aid of the Missions of the United Brethren, commonly called Moravians. For the year 1837. London, 1838.—*From the same.*

Particulars of recent Intelligence respecting the Missions of the United Brethren. Nos. 36 and 37. London, 1837 and 1838.—*From the same.*

Proceedings of the Church Missionary Society for Africa and the East. Thirty-eighth year. London, 1838.—*From the same.*

Thirty-fourth Report of the British and Foreign Bible Society. London, 1838.—*From the same.*

Proceedings of the Prayer Book and Homily Society, during its twenty-fifth year. London, 1837.—*From the same.*

Report of the Proceedings of the Naval and Military Bible Society. London, 1838.—*From the same.*

Extracts from the Second and Third Reports of the Inspectors of Prisons for the Home District. Two Vols. London, 1837 and 1838.—*From the same.*

Seventh Annual Report of the Trustees of the New England Institution for the Education of the Blind. Boston, 1839.—*From Dr. Howe.*

Second Annual Report of the Geological Survey of the State of Ohio. By W. W. Mather. Columbus, 1838.—*From the Author.*

Documents relating to the Improvement of the Navigation of the Mississippi River. New Orleans, 1837.—*From Mr. Lewis Troost.*

The Indian Tribes of North America. No. 13. Philadelphia, 1839. *From Mr. F. W. Greenough, Publisher.*

Some Account of the Art of Photoginic Drawing. By Henry Fox Talbot, Esq. F.R.S. London, 1839.—*From the Author.*

Vocabolario Universale della Lingua Italiana. Vol. VI. Part XXXVI. Naples, 1839.—*From the Chev. Morelli.*

Di Quattordici Vasi d'Argento discotterati in Pompei nel 1835. Discorso del Cavalier Bernardo Quaranta. Naples, 1837.—*From Mr. Du Ponceau.*

Di un Vaso Greco Dipinto che si conserva nel Real Museo Borbonico. Discorso del Cavalier Bernardo Quaranta. Naples.—*From the Author.*

Försök til en Flora Oeconomica Sveciæ. Af A. J. Retzius. Two Parts. Lund, 1806.—*From Mr. John Vaughan.*

Life of Arthur Lee, LL. D. By Richard Henry Lee, A. M. Boston, 1839.—*From the same.*

Rapport fait à l'Académie des Sciences, par M. Arago, sur des Appareils de Filtrage de M. Henri de Fonvielle. Paris, 1837.—*From Professor A. D. Bache.*

Statistique de la Peine Capitale en Belgique, en France, en Angleterre et en Prusse, par Ed. Ducpétiaux. Brussels.—*From the same.*

A Grammar and Vocabulary of the Language of New Zealand. London, 1820.—*From the Rev. J. P. Engles.*

Directions for rightly offering up Secret Prayer. (In Armenian.)—*From the same.*

Proverbs in Hinduwee.—*From the same.*

A Spelling Book written in the Chahta (Choctaw) Language, with an English Translation. Cincinnati, 1827.—*From the same.*

L'Exercise du Microscope, par François Watkins. London, 1754. *From the same.*

West Port Murders. Report of the Trial of Burke and M'Dougal. Edinburgh, 1829.—*From the same.*

Bibliotheca Sanscrita. Literatur der Sanskrit Sprache von Friedrich Adelung. St. Petersburg, 1837.—*From the Author.*

O Kind! Die berühmte ethische Abhandlung Ghasalis. Von Hammer-Purgstall. (Arabisch und Deutsch.) Vienna, 1838.—*From the Author.*

Facts and Reasons in support of Mr. Rowland Hill's plan of a Universal Penny Postage. By W. H. Ashurst.—*From Mr. Wm. Brown.*

An Elementary Treatise on the Tides. By J. W. Lubbock, Esq. Treas. R. S. etc. London, 1839.—*From the Author.*

Note sur les Étoiles Filantes du 12 Novembre, 1838, par M. A. Quetelet. Brussels, 1839.—*From the Author.*

Note sur les Tableaux Météorologiques pour l'Année 1838, à Bruxelles, par M. A. Quetelet. Brussels.—*From the same.*

Experimental Researches in Electricity. By Michael Faraday, D. C. L. &c. Fifteenth series, and Index to series I. to XIV. inclusive. London, 1839.—*From the Author.*

An Inquiry into the Nature of the Numerical Contractions, found in a passage on the Abacus, in some MSS. of the Geometry of Anicius Manlius Torquatus Severinus Boetius, and Notes on Early Calendars. By James O. Halliwell, Esq. London, 1839.—*From the Author.*

Tracts on Docks and Commerce, with an Introduction, Memoir, and Miscellaneous Pieces. By William Vaughan, Esq. F. R. S. London, 1839.—*From the Author.*

Narrative of a Journey across the Rocky Mountains to the Columbia River. By John R. Townsend. Philadelphia, 1839.—*From the Author.*

The American Journal of Science and the Arts. Conducted by Benjamin Silliman, M. D., LL. D., aided by Benjamin Silliman, Jr., A. B. Vol. XXVII. No. 1. New Haven, 1839.—*From the Conductors.*

Professor Bache, on behalf of the Committee appointed on the paper of Professor Elias Loomis, of Western Reserve College, Ohio, entitled "Observations to determine the Magnetic Dip at various places in Ohio and Michigan," reported in favour of publication, and the Report was adopted.

The observations recorded in this paper were made with a dipping needle by Gambey. The results are contained in the following table.

Place.	Latitude.	Longitude.	Date.	Magnetic Dip.
Hudson, Ohio, . . .	41° 15′ N.	81° 24′ W.	September, 1838.	72° 48′.2
Do. . . .	,, ,,	,, ,,	April, May, 1839.	72 46.8
Cleveland, Ohio, . .	43 30	81 51	May, ,,	73 26.0
Detroit, Michigan, .	42 19	83 03	,, ,,	73 42.6
Ann Arbor, ,, .	42 18	83 45	,, ,,	73 13.9
Ypsilanti, ,, .	42 14	83 38	,, ,,	73 18.0
Monroe, ,, .	41 55	83 28	,, ,,	73 32.3
Toledo, Ohio, . . .	41 41	83 33	,, ,,	73 06.1
Maumee City, Ohio, .	41 34	83 38	,, ,,	72 49.1
Sandusky, ,, .	41 29	82 48	,, ,,	72 57.8

Professor Loomis infers from a comparison of these observations with others made in the eastern part of the United States, that the lines of equal dip intersect the parallels of latitude, their direction being from about N. 82° W. to S. 82° E.

Dr. Chapman, from the Committee appointed to apply to Mrs. Madison, for certain meteorological observations made by the late President Madison, reported that a number of documents had been received, and presented them to the Society. The Secretaries were directed to return thanks to Mrs. Madison for this donation.

A necrological notice of the late Bishop White, prepared in pursuance of the request of the Society, by Bishop De Lancey, was read.

Dr. Chapman announced the death of Matthew Carey, of Philadelphia, a member of the Society, and Mr. Lea was requested to prepare an obituary notice of the deceased.

Dr. Bache announced the decease of Dr. Robert Perceval, of Dublin, a member of the Society.

The Librarian of the Society was authorized to furnish to the family of the late Dr. Bowditch, to be placed in the library of the deceased, any volumes of the Transactions which may be deficient in the set belonging to Dr. Bowditch, and the future volumes, so long as the library shall be kept open for public use.

Dr. Hays presented a table, compiled by him, of the peculiarities in various cases of individuals not able properly to distinguish colours. Mr. Kane added the comparisons which he had made, in the case of a friend, with the specimens named by Dr. Dalton, of Manchester, in the possession of Professor Bache.

Professor Bache made a verbal communication of the measures taken by the British government, on the recommendation of the British Association, and under the advice of the Royal Society, for obtaining a series of magnetic observations in different quarters of the globe, in conjunction with a naval expedition in the southern hemisphere, under the command of Capt. James Clark Ross, and read extracts from letters of

Professor Lloyd and Major Sabine, relating to the preparation for the undertaking.

Professor Bache further stated, that on submitting the circular addressed to him by the Foreign Secretary of the Royal Society, with extracts from the letters before referred to, and other information as to the nature and importance of the results to be obtained by this combined system of magnetic observations, to the Building Committee of the Girard College, through their Architect, they had, with creditable liberality, given orders for the erection of an observatory suited to the observations contemplated, and to the instruments already in the possession of the Trustees of the College.

Professor Bache submitted the plans of the observatory, drawn by Thos. U. Walter, Esq. Architect.

Mr. Justice made some remarks in continuation of those offered at the last meeting of the Society, in support of his opinion of a gyratory motion in the tornado of the 31st July, the destructive effects of which were felt about seventeen miles north of Philadelphia.

Stated Meeting, October 4.

Present, twenty-one members.

Mr. Du Ponceau, President, in the Chair.

The following donations were received:—

FOR THE LIBRARY.

Mémoires de l'Académie Royale des Sciences Morales et Politiques de l'Institut de France. Vol. II. Second series. Paris, 1839.—*From the Academy.*

Institut Royal de France. Séance Publique Annuelle des Cinq Académies, 1839. Paris, 1839.—*From Mr. D. B. Warden.*

Institut Royal de France. Séance Publique Annuelle de l'Académie des Sciences Morales et Politiques, 1839. Paris, 1839.—*From the same.*

Recueil de Voyages et de Mémoires publié par la Société de Géographie. Vol. IV. Paris, 1839.—*From the Society.*

Transactions of the Society for the Encouragement of Arts, Manufactures, and Commerce, for the Session 1831–32. Vol. XLIX. Part I. London, 1832.—*From the Society.*

The Transactions of the Linnean Society of London. Vol. XVII. Part IV., and Vol. XVIII., part II. London, 1837 and 1839.—*From the Society.*

List of the Linnean Society of London, 1839. London, 1839.—*From the same.*

Transactions of the Horticultural Society of London. Second series. Vol. II. Part III. and IV. London.—*From the Society.*

Proceedings of the Horticultural Society of London. Nos. 1 to 6 inclusive. London 1838 and 1839.—*From the same.*

Proceedings of the Committee of Commerce and Agriculture of the Royal Asiatic Society of Great Britain and Ireland. London, 1839.—*From the Society.*

Proceedings of the Zoological Society of London. Part VI. London, 1838.—*From the Society.*

Reports of the Council and Auditors of the Zoological Society of London, 1839. London, 1839.—*From the same.*

Histoire du Régiment de Champagne, par Roux de Rochelle. Paris, 1839.—*From the Author.*

Elements of Geology, by Charles Lyell, F.R.S. First American from the first London edition. Philadelphia, 1839.—*From James Kay, Jr. and Brother.*

A Bengalee Almanac.—*From the Rev. J. P. Engles.*

Maps to illustrate the Easy Introduction to Astronomy in Hindustáni. *From the same.*

Assolements et Culture des Plantes de l'Alsace, par J. N. Schwerz. Traduit de l'Allemand et annoté par Victor Rendu. Paris, 1839. *From Mr. D. B. Warden.*

L'Art de vérifier les Dates, depuis l'Année 1770, jusqu'a nos jours. Vol. XVII. (Vol. IX. of the series relating to America.) Paris, 1837.—*From the same.*

Fragments sur l'Histoire Politique et Littéraire de l'ancienne République de Raguse et sur la Langue Slave. Par le Comte Duc de Sorgo. Paris, 1839.—*From the same.*

Chemical Diagrams, or Concise Views of many interesting Changes produced by Chemical Affinity. By Jacob Green, M.D. Philadelphia, 1837.—*From the Author.*

Remarks on the Trilobite, and Description of a New Trilobite. By Jacob Green, M.D. New Haven, 1839.—*From the same.*

London Catalogues of Books for 1839. Two Vols.—*From Mr. Edward D. Ingraham.*

Popular Lectures on Geology, by R. C. Von Leonhard. Translated by the Rev. J. G. Morris, A.M., and edited by Professor F. Hall, M.D. Baltimore, 1839.—*From the Editor.*

The American Almanac and Repository of Useful Knowledge, for the year 1840. Boston, 1839.—*From the Editor.*

FOR THE CABINET.

A specimen of Iron Ore from the Island of Cuba.—*From Mr. R. C. Taylor.*

The Committee, consisting of Dr. Dunglison, Mr. Kane, and Mr. Lea, to whom were referred a letter of the Rev. Charles Gutzlaff to John Vaughan, Esq. dated Macao, January 2, 1839, and the letter of Peter S. Du Ponceau, Esq. to the same gentleman, dated Philadelphia, September 20, 1839, made their report, which was read and accepted.

The communication of Mr. Gutzlaff was suggested by the dissertation of Mr. Du Ponceau, "On the nature and character of the Chinese system of writing." As the results of his reflection and observation, Mr. Gutzlaff affirms, that China was the great centre of civilization, whence it diverged to all the countries of Eastern and Southern Asia; the colonists from China driving the autochthonous tribes into the mountains, and incorporating the country itself, including Tunkin and Annam, with the central kingdom. A constant influx of Chinese also took place into Korea, but the emigration to Japan and the Loo Choo Islands was less extensive.

Chinese words, and the Chinese art of writing, were thus introduced into these countries: Chinese books became their literature; and, like the Latin in the middle ages, the Chinese was the language of the learned. Yet all the nations that have adopted the Chinese mode of writing, speak a language more or less distinct from the written idiom. The different nations, too, who employ the Chinese characters, call them differently, using their own language to designate them, and they, as well as the Chinese themselves, have to learn the meaning of the characters from teachers, who explain them in the dialect spoken amongst the people. The dialects spoken by the different nations,

who use the Chinese character, are very distinct from the language of China proper. The Koreans and Japanese, whilst they transact all important business in the Chinese character, have a syllabary with which they write their own language. The Cochin Chinese occasionally use the Chinese in a contracted form, without any reference to its meaning, to express sound, but they have no syllabary.

It is not strictly true that sound is not inherent in the Chinese character. A majority of the signs are not pronounced by the Chinese at random, nor do the nations abandon all analogy in reading them, although they vary much. Mr. Gutzlaff has been struck with the ease with which communication may be held with the Cochin Chinese, Japanese and Koreans, by means of the Chinese character, even without comprehending a word of their idiom. This, he says, does not refer to the learned classes only, but to the very fishermen and peasants, with some exceptions only. In the Loo Choo Islands, men of distinction talk Chinese with great fluency, but the mass of the people speak a dialect of the Japanese, and employ the Chinese character as well as the Japanese syllabary. Mr. Gutzlaff considers it certain, that the nations who have adopted the Chinese character, attach the same meaning to it as the natives from whom it was originally derived, and that its construction is likewise retained with scarcely any alterations.

The communication of Mr. Du Ponceau is a rejoinder to that of Mr. Gutzlaff. Mr. Du Ponceau repeatedly combats the notion entertained by some, that the superiority of the Chinese alphabet is such, that it forms a kind of pasigraphic system, which may be adapted to every language. He admits, to a certain extent, what he was disposed at one time to doubt, that the Chinese characters do actually serve as a means of communication between different nations, who can neither speak nor understand each other's oral language, and he investigates, at some length, the causes by which this effect is induced; but he expresses himself at a loss to understand how the fishermen and peasants of Japan, Korea and Cochin China, "with only some exceptions," can be readily communicated with by means of Chinese characters, even by a person who does not understand a single word of their spoken language. The remark of Mr. Gutzlaff, he conceives, cannot be meant to imply that all, or nearly all the fishermen and peasants of the countries referred to, can read and write the Chinese; for, on the authority of Mr. Medhurst, there are villages, even on the coast of China, where few, if any, of the inhabitants can either read or write. If, however, the assertion of Mr. Gutzlaff be assumed to

be rigorously accurate, it will have to be explained by the circumstance, that as the Chinese is esteemed a universal medium of communication between the people referred to, it is more extensively taught amongst them than even amongst the Chinese themselves.

Mr. Du Ponceau enters, at some length, into the nature of the four languages, or classes of languages which are embraced in the communication of Mr. Gutzlaff. 1. Of the various dialects of the Chinese. 2. Of the Annamitic languages. 3. Of the languages of Japan and the Loochoo Islands; and 4. Of the Korean; the two first of which are monosyllabic, the two last polysyllabic; and from all the facts and reflections, he concludes, that the circumstance of the Chinese characters being understood so extensively amongst these people, is not owing to any thing inherent in the Chinese characters, in their shape or greater perspicuity, but to their connexion with the languages from which they were formed, and to the mode in which they have been adapted to them. The vernacular languages of Japan, the Loochoo Islands, and Korea, are so different from the Chinese, that it was found impossible to apply to them the Chinese system of writing; consequently, when the people of these countries read the Chinese characters, they do not read them in their native language, but in the Chinese, which they have acquired, but pronounce differently from the Chinese themselves. This is not the case with the people of Tunkin and Cochin China—the Annamites; their language or languages being formed on the model of that of China, with some variations, which they learn, in their schools, to correct, and to employ the proper characters as a superior orthography, by which they are enabled to read the Chinese as well as their own language.

The Committee recommended that the interesting communications of Mr. Gutzlaff and Mr. Du Ponceau, tending as they do, to elucidate a contested topic of Oriental Philology, be published in the transactions of the Society.

Dr. Hare made a verbal communication on the subject of tornadoes, and on his electrical theory of their formation, supporting his views by reading an extract from a Memoir by M. Peltier, describing a destructive tornado which occurred near Paris, in June last.

Dr. Hare stated that agreeably to a publication in the Journal des Débats for the 19th of July, some losers by this tornado having effected insurance against damage from thunder gusts, applied to the insurers

for indemnity, which was refused, upon the plea that a tornado was not a thunder gust (orage). The question having been submitted to Arago, it was by him referred to Peltier.

Peltier, after due investigation, came to the conclusion that a tornado is a modification of the thunder gust, in which, in lieu of passing in the form of lightning, electricity passes through a cloud, acting as a conductor between the terrestrial surface and the sky. It will be perceived that this view of the subject differs but little from that which, in a memoir in the transactions of the Society, had been presented by Dr. Hare, in the following language:—"A tornado is the effect of an electrified blast of air, superseding the more usual means of discharge between the earth and clouds, in the sparks and flashes which we call lightning. I conceive that the effect of such a current would be to counteract, within its sphere, the pressure of the atmosphere, and thus to enable this fluid, in obedience to its elasticity, to rush into the rarer medium above."

Dr. Hare went on to say, that the only difference arises from the omission of the Parisian philosopher to call in the electricity of the air in aid of the electrical forces, and his assigning to a cloud the agency which Dr. Hare had attributed to a vertical blast of electrified air, mingled with every species of moveable matter coming within the grasp of the meteor; and that it would seem, from a subsequent communication made by Peltier to the Institute, that he had so entirely misapprehended Dr. Hare's theory, as to ascribe to it deficiencies for which it was not amenable, but which had existed in his own explanation, as stated in his report.

The fault of Dr. Hare's explanation was, according to him, "*en ne tenant pas compte des forces nouvelles que la première*, (that is to say, the electric attraction,) *acquiert par le mouvement gyratoire qui accompagne souvent la coulonne de nuages et d'eau qu'on appelle trombe.*"

As the most appropriate refutation of this mistatement, Dr. Hare stated that he would quote a paragraph from his Memoir.

"*When once a vertical current is established, and a vortex produced, I conceive that it may continue after the exciting cause may have ceased.*

"*The effect of a vortex in protecting a space about which it is formed, from the pressure of the fluid in which it has been induced, must be familiar to every observer. In fact, Franklin ascribed the water spout to a whirlwind.*

"*His hypothesis was, I conceive, unsatisfactory, because it did not assign any cause for the concentration of the wind, or for the hiatus presumed to be the cause. This deficiency is supplied, if my suggestions be correct.*"

On reading this passage, after previously hearing or reading the allegation above quoted, that Dr. Hare's hypothesis was defective in not appealing to a gyratory movement, it was presumed that it would be perfectly evident to every one, that, from ignorance of English, or inattention, Mr. Peltier's statement was the reverse of the reality.

In proof of a gyratory force having been exercised during the New Brunswick tornado, Dr. Hare referred to his having, in his Memoir, cited the case of a chimney, of which the upper portion had been so twisted upon the lower portion, as to have its corners projecting over the sides of the latter; but he had now taken a different view of that fact, which had since struck him as being of much higher importance than he had formerly considered it.

During an examination of the track of the tornado which lately ravaged the suburbs of New Haven, Dr. Hare had been led to infer that the electrical discharge is concentrated upon particular bodies, according to their character, or the conducting nature of the soil; so that the vertical force arising from electrical reaction, and the elasticity of the air, acts upon them with peculiar force. Hence, while some trees were borne aloft, others, which were situated very near them, on either side, remained rooted in the soil. In two instances at New Haven, wagons were especially the victims of the electro-aërial conflict. In the case of one of these, the axletree was broken, and while one wheel was carried into an adjoining field, the other was driven with so much force against the weather-boarding of a barn, as to leave both a mark of the projecting hub, and of the greater portion of the periphery. The plates of the elliptical springs were separated from each other. During the tornado at New Brunswick, the injury done to some wagons in the shop of a coach-maker, appeared, at the time, inexplicable. It was now inferred, that the four iron wheel tires, caused, by their immense conducting power, a confluence of the electric fluid, producing a transient explosive rarefaction, and a subsequent afflux of air with a local gyration of extreme violence.

It may be reasonably surmised, that the excessive injury done to trees results, not from the general whirl, but from a local gyration to

which they are subjected, in consequence of the multiplicity of points which their twigs and leaves furnish for the emission of the electrical fluid. The fact that the leaves of trees thus injured, appear afterwards as if they had beeen partially scorched, seems to countenance this idea. The twisting of the chimney at New Brunswick, as above mentioned, seems difficult to explain, agreeably to the idea of a general whirl throughout the whole area of the tornado track. The chances are infinitely against any chimney having its axis to coincide with that of a great whirlwind, forming a tornado; and it must be evident, that in any other position, it could only be subjected to the rotary force on one side at a time. But if this were adequate to twist the upper upon the residual portion, the former would necessarily be overthrown. Evidently, it could not be left, as was the chimney which called forth these remarks.

During the tornado at New Haven, chimneys seemed to be especially affected. One, after being lifted, was allowed to fall upon a portion of the roof of the house to which it belonged, at a distance from its previous situation too great to have been reached, had it been merely overthrown. In the case of a church which was demolished, a portion of the chimney was carried to a distance greater than it could have reached without being lifted by a vertical force.

It appeared quite consistent that chimneys should be particularly assailed, since that rarefaction, which, by operating upon the roofs of houses, carries them away, must previously cause a great rush of air through the chimney flues. But this concentration of the air must tend to facilitate the "convective"* discharge in that direction; since an electrical discharge by a blast of air, is always promoted by any mechanical peculiarities favouring an aërial current, or jet.

That during a recent tornado in France, articles were carried from the inside of a locked chamber to a distance without, when no opening existed besides that afforded by a chimney, seemed to justify the suggestion that there must be a great rush of air through such openings.†

* A "convective" discharge, or a discharge by "convection," in the very appropriate language of the celebrated Faraday, is a process by which electricity is conveyed by the transfer of electrified bodies from one excited surface to another in an opposite state. This is conceived to be a good definition of the discharge which produces a tornado.

† Dr. Hare did not conceive it proper to trespass upon the time of the Society, to make any allusion to that part of his Memoir, in which the three enormous concentric spaces occupied by the earth, the denser non-conducting atmosphere, and the rare conducting medium beyond the denser atmosphere,

Dr. Hare also made some remarks on the aurora which occurred on the third of September, in which he suggested that the electric fluid, producing the phenomena then observed, might have been derived from remote parts of space.

Stated Meeting, October 18.

Present, thirty-one members.

Mr. Du Ponceau, President, in the Chair.

The following donations were received:—

FOR THE LIBRARY.

Nova Acta Regiæ Societatis Scientiarum Upsaliensis. Vol. X. Upsala, 1832.—*From the Society.*

Mémoires publiés par la Société Royale et Centrale d'Agriculture. Année, 1838. Paris, 1838.—*From Mr. D. B. Warden.*

Extraits des Procès-Verbaux de la Société Philomathique de Paris, 1836, 1837, 1838.—*From the same.*

Académie Royale des Sciences de Turin. Classe des Sciences Physique et Mathématiques. Question de Physique, pour l'année 1841. Turin, 1839.—*From the Academy.*

Triennial Catalogue of the Theological Seminary, Andover, Massachusetts. Andover, 1839.—*From the Rev. Oliver A. Taylor.*

Report on the Magnetic Isoclinal and Isodynamic Lines in the British Islands. By Major Edward Sabine, R. A. F. R. S. London, 1839.—*From the Author.*

Allgemeines Bibligraphisches Lexikon. Von Friedrich Adolf Ebert. Leipsic, 1821.—*From Mr. John Penington.*

are represented as competent to perform a most important part in the production of electrical storms; nor did he feel at liberty to make any remarks in support of an opinion which he had recently formed, that a hurricane is a gigantic tornado. Neither had he time to cite the evidence furnished by Reid's work upon storms, in favour of a local force or gyration, like that of which he had seen proofs, arising from the New Haven tornado.

A System of Anatomy for the Use of Students of Medicine. By Caspar Wistar, M. D. With Notes and Additions by William E. Horner, M. D. Seventh Edition. By J. Pancoast, M. D. Two Vols. Philadelphia, 1839.—*From the Editor.*

A Sketch of Chinese History, Ancient and Modern. By the Rev. Charles Gutzlaff. Two Vols. New York, 1834.—*From Mr. John Vaughan.*

Catalogue of the Library of the Theological Seminary in Andover, Massachusetts. By Oliver A. Taylor, M. A. Andover, 1838.—*From the Trustees of the Seminary.*

Rapport sur les travaux dans la vue de déterminer la marche du temps dans les principales localités du Royaume de Belgique, par A. Quetelet, Directeur de l'Observatoire de Bruxelles. Brussels, 1839.—*From the Author.*

Synopsis Reptilium Sardiniæ Indigenorum. Auctore Josepho Géné. Turin, 1839.—*From the Author.*

Osservazioni Mineralogiche e Geologiche per servire alla Formazione della Carta Geologica del Piemonte di Angelo Sismonda. Turin, 1839—*From Prof. A. D. Bache.*

Historical Account of Massachusetts Currency. By Joseph B. Felt. Boston, 1839.—*From Mr. T. L. Winthrop.*

Institut Royal de France. Funérailles de M. Langlois. Discours de M. Le Bas. Paris, 1839.—*From Mr. D. B. Warden.*

Institut Royal de France. Académie Française. Translation des Restes de la Harpe. Discours de M. Tissot. Paris, 1839.—*From the same.*

L'Echo du Monde Savant. Nos. 450 and 451. Paris, 1839.—*From the same.*

Description d'un Colorimètre a Double Lunette, par M. Collardeau. Paris, 1839.—*From the same.*

Discours de M. le Baron Thénard, a l'occasion des récompenses décernées le 28 Juillet, 1839. Paris, 1839.—*From the same.*

Description d'un nouveau Procédé pour prévenir les Explosions des Chaudières à Vapeur. Par M. Félix Passot. Paris.—*From the same.*

Filtrations Publiques. Réponse aux Détracteurs du Système Fonvielle. Paris, 1839.—*From the same.*

Notice sur les Embaumements, procédés de M. Gannal. Paris.—*From the same.*

Ostéographie ou Description Iconographique Comparée du Squelette et

du Système Dentaire des cinq Classes d'Animaux vertébrés récents et fossiles. Par M. H. M. Ducrotay de Blainville. (Prospectus.) Paris, 1839.—*From the same.*

Note sur l'Origine de nos Chiffres et sur l'Abacus des Pythagoriciens. Par. A. J. H. Vincent. Paris.—*From the same.*

Compte Rendu des travaux de la Société Royale et Centrale d'Agriculture. Année 1837–38. Par M. Soulange Bodin. Paris, 1838. *From the same.*

Histoire de l'Introduction et de la Propagation des Mérinos en France; ouvrage posthume de M. Tessier. Paris, 1839.—*From the same.*

Question des Sucres. Nouvelles Considérations. Par C. J. A. Mathieu de Dombasle. Paris, 1838.—*From the same.*

Société Royale et centrale d'Agriculture. Rapport sur le Concours pour les Ouvrages, Mémoires et Observations de Médécine Vétérinaire pratiques. M. Girard, rapporteur. Paris.—*From the same.*

Pamphlets relating to Agriculture and on Miscellaneous Subjects, (in French and English.) Paris.—*From the same.*

The National Portrait Gallery of Distinguished Americans. Part XLII. Biography of Charles Cotesworth Pinckney. Philadelphia, 1839.—*From the Author.*

Third Specimen of a New Method of Printing Music for the Blind, invented by M. Snider. Philadelphia, 1839.—*From the Inventor.*

Legenda Svecana Vetusta S. Magni Comitis Orcadensium. Upsala. *From President John Henry Schröder.*

Numi Ducum Reipublicae Venetae in Numophylacio Academico Upsaliensi. Upsala.—*From the same.*

Mahmud Schebisteri's Rosenflor des Geheimnisses. Persisch und Deutsch. Von Hammer-Purgstall. Pest, 1838.—*From the Author.*

Hindustani Atlas.—*From the Rev. J. P. Engles.*

Biblical Apparatus, in four Parts: Designed to Assist in the Correction of Present, and the Preparation of Future Versions of the Sacred Scriptures. By the Rev. W. Yates. (Prospectus.) Calcutta, 1837.—*From the same.*

Jahrbücher der Literatur. Nos. 81 to 84, inclusive. Vienna, 1838.—*From Baron Von Hammer-Purgstall.*

Chinese Magazine. Edited by the Rev. Charles Gutzlaff. (Chinese.) Nos. 6 to 9, inclusive.—*From the Editor.*

The American Medical Library and Intelligencer. By Robley Dunglison, M.D. Nos. 11 to 14 Philadelphia, 1839.—*From the Editor.*

Specimen of the Transfer Process invented by Joseph Dixon of Taunton, Massachusetts. Boston, 1839.—*From the Author.*

Mr. S. C. Walker, in behalf of the Committee on the paper entitled, "Astronomical Observations made at Hudson Observatory, &c. by Elias Loomis, Professor of Nat. Philos., &c. in the Western Reserve College, Hudson, Ohio," made the following report:—

The memoir of Prof. Loomis contains a description of the Hudson Observatory, erected at the expense of the Western Reserve College, at Hudson, Ohio. The building consists of a central portion, fifteen feet square upon the inside. From a circular platform of ten feet diameter, rise twelve small cherry columns, that sustain a hemispheric dome of nine feet internal diameter, covering a five and a half feet equatorial of 3.8 inches aperture, by Simms. The dome rotates on ten lignumvitæ wheels of five inches diameter. The equatorial rests on an insulated pier, descending six feet below the surface of the ground, and rising three feet above the platform, which is, itself, about six feet above the surface of the ground.

The eastern wing is ten feet by twelve, and seven and a half feet high, and covers a Simms' transit circle of eighteen inches diameter, graduated on platinum to 5′, and reading to single seconds by three Troughton's microscopes. The telescope has a focal length of thirty inches and an aperture of 2.7 inches. The transit circle, and a clock by Molyneux are each mounted on separate insulated piers. The western wing contains no instruments; but serves for a lodging-room, computing-room, &c.

Prof. Loomis gives the following results for the latitude of the Hudson Observatory.

By u. c. Polaris,	Aug. 8,	Latitude	41°	14′	39.″8
	„ 10,				36.7
	„ 13,				36.8
	„ 14,				37.8
	„ 15,				40.8
	„ 17,				36.6
		mean	41	14	38.1

By u. c. δ ursæ minoris, Aug. 13, Latitude	41°	14′	35.″1
„ 17,			36.2
mean	41	14	35.7

From which he concludes that the latitude is 41° 14′ 37.″ nearly.

The paper contains a series of fifty moon culminations, one eclipse, and six occultations, observed in 1838 and 1839. These furnish data for determining the longitude of the Hudson Observatory when corresponding European and American observations shall have been obtained. Prof. Loomis gives for the approximate longitude *5h 25m 42s*. It may be proper to add, that one of the undersigned, S. C. Walker, having reduced the six occultations contained in this paper, and compared them with four corresponding observations at the Philadelphia Observatory, four at the Dorchester Observatory, two at Mr. Paine's House, Boston, and one at Princeton College, New Jersey, finds for the longitude of the Hudson Observatory, *5h 25m 47s*.

The instruments for this observatory were selected by Professor Loomis during his late journey in Europe. This economical establishment appears to be more complete than any of the kind now known to be in operation in the United States, and the Committee cordially recommend the example of the Western Reserve College, as worthy of being followed by those Universities which are desirous, at moderate expense, of inculcating practical astronomy, of making observations highly useful for geographical purposes, and of prosecuting interesting researches connected with the progress and advancement of astronomy.

The Committee recommend the paper for publication.

Sears C. Walker,
R. M. Patterson,
Geo. M. Justice,
Committee.

The recommendation in favour of publication, was adopted.

Dr. Bache, on behalf of the Committee on Dr. Hare's paper, entitled "On the extrication of Barium, Strontium and Calcium," reported in favour of publication in the Society's Transactions, which was ordered accordingly.

In this paper Dr. Hare first calls attention to the following phenomenon observed by him almost twelve years since, and published.

When the circuit in a galvanic battery, the deflagrator of the author, was completed through a saturated solution of chloride of calcium, the anode being formed by a coarse, and the cathode by a fine platinum wire, the latter was rapidly fused, while, when the situation of the wires was reversed, the ignition was comparatively feeble. It having occurred, some months since, to Dr. Hare, that this phenomenon might be due to the evolution and combustion of calcium at the cathode, he proceeded to apply a galvanic deflagrator of three hundred and fifty pairs of plates, in the process of Berzelius and Pontin, for preparing the amalgams of the metallic radicals of the earths. The author gives a sketch of the present state of our knowledge in relation to the metallic bases of the alkaline earths, as derived from the experiments of Davy; adding his own observations, in confirmation of the declaration of Davy, that the substances obtained by him from baryta and strontia, were amalgams of their metallic bases, and not the bases themselves; and, further, that the process employed for obtaining calcium, by Davy, was really incompetent to effect the desired result. He then proceeds to describe the peculiar apparatus by which amalgams of barium, strontium and calcium were procured; the chlorides of the respective alkaline radicals being exposed to galvanic action, the cathode being mercury, and the anode a coil of platinum wire. The details of the apparatus cannot be properly understood without the figure which accompanies Dr. Hare's communication: its chief peculiarities are the following: 1st. It furnishes the means of keeping the mercury, forming the cathode, at a temperature nearly as low as 32° Fah. 2d. It prevents exposure of the amalgam of the radical, to the direct action of the chlorine from the chloride used. 3d. The alternate and successive, or the simultaneous action of two galvanic deflagrators, was conveniently obtained.

Dr. Hare states, that after operating with a series of two hundred pairs of plates of one hundred square inches each, for twenty minutes, unaided by these improvements, he had found the proportion of calcium to be but one six-hundredth part of the amalgamated mass.

An apparatus for distilling the amalgam is also described and figured in Dr. Hare's memoir. It consists of an iron alembic, connected with a glass receiver, and an adopter communicating with a reservoir of hydrogen, and containing chloride of calcium and quicklime. Within the alembic, an iron crucible, containing the amalgam, was placed, the crucible being closed by a capsule, in which was a portion of caoutchoucine, and by its cover. Naphtha was poured into

the alembic. The air from the apparatus was expelled by hydrogen, desiccated by passing through the chloride of calcium and quick-lime in the adopter. The distillation was conducted by applying heat principally to the upper part of the amalgam, to prevent an explosive ebullition. The mercury being distilled off, which requires a bright red heat in expelling the last portions, the metallic radical remained in the crucible.

The metals oxidize rapidly in water; are brittle, fixed, and require a good red heat for fusion. They sink in sulphuric acid. By keeping in naphtha, they acquire a coating which renders them less active when exposed to water.

Dr. Hare attempted to separate the mercury from the amalgams when solidified by the use of solid carbonic acid, by straining them through leather, but the result did not answer his expectations.

By using solid carbonic acid and hydric (sulphuric) ether, Dr. Hare solidified a mass of the amalgam of ammonium. He considers that in this case a portion of ether combines with the alloy, without impairing its metallic character.

Professor Bache, Reporter, informed the Society, that No. 7 of the Society's Proceedings, was now printed.

Professor Bache, in behalf of Professor Alexander, of Princeton, made a verbal communication of a description of the aurora borealis, of September 3d, 1839, as it appeared at Princeton.

At about ten or fifteen minutes past eight, P. M. an ill-defined, but considerably bright light was seen to extend for some distance above the horizon, in a direction nearly due east; it was similar, in intensity and appearance, to a lunar twilight. Soon after this, a continuous arch or zone of light was manifest, extending from the same spot to the opposite, or nearly opposite portion of the western horizon. This soon separated into two parts,* and, after a short interval, beams of light shot up from the eastern portion of the arch, which were speedily multiplied in every direction around the observer, except within about thirty degrees of the *true* (or, it might be, *magnetic*) south.

A corona was soon formed, which was at first quite indistinct, and was not continuous for any great length of time, during the existence

* Two arches, it is believed, were at this time formed, and either separated throughout their entire extent, or united only near their extremities; but this my notes do not explicitly state.

of the aurora, except at the period of its greatest brilliancy. At about twenty minutes past eight, this corona was situated in a line with, and about midway between α Aquilæ and α Lyræ. This may be considered as a very tolerable approximation to its position, though, from the apparent intersection, or, as it might almost be termed, interweaving of the beams which composed it, it was not often easy to fix upon the place of its centre with much precision, if indeed that which seemed its centre, did not really change its place; since, at times, it seemed to occupy a position very sensibly lower than that which the preceding observation would indicate.

At about half past eight, the appearance of the aurora was superb. The radiations which extended from the corona, nearly reached the horizon in every direction, with the exception of those which tended toward the southern space beforementioned, which, it is believed, was even at this time bounded by something like an arch, that was convex toward the zenith. The aurora was often party-coloured; frequently of a rose-red, especially in spots, in that portion of the sky which might be supposed to be near the plane of the dipping needle; and also about the centre of the corona. It was in the part of the heavens here described, that the arch of greatest intensity could most commonly, if not uniformly, be traced: though the crown of it frequently faded away, or became excessively faint.

Between the spots, of red light, or beams of the same tint, others were observed, which, either from the effect of the first mentioned colour, or something peculiar to themselves, appeared of a colour approaching to a bottle-green.

At times, again, when the corona was deficient, the appearance of what remained on each side of the vacant spot, was not unlike that of two immense comets; their heads some small distance asunder, and their tails turned eastward and westward.

The light of the corona, when most perfect, was quite dense, not only at the central point, but also near to what seemed to be the outer limits of its radiations, at which the tint commonly exhibited the nearest approach to white.

Two meteors or shooting stars were seen, which in both cases *appeared* to pass *between* the aurora and the eye of the observer; one nearly in the direction of the arch of greatest intensity, and the other almost perpendicular to it. The precise times of their appearance were not noted, though they fell within that period in which the phenomena already described were exhibited.

The corona formed again at nine; and, though again broken, was imperfectly visible after that time.

At half past nine, the eastern portion of the sky became tinted with intense red and green; but at half past ten, little else remained than the appearance of bright horizontal beams of a white colour in the north.

If it be admitted that the centre of the aurora was precisely midway between α Aquilæ and α Lyræ, at twenty minutes past eight, its azimuth must have been 1° 14′ 42″ E. of S., and its altitude 73° 27′ 6″; the latitude of the observer being 40° 20′ 47″ N. The point thus designated, would be very nearly in the direction of the dipping needle; the dip being, by observation, 72° 47′ 6″ (72° 47.1′) and the variation (though not accurately determined,) some 4° W. or that of the S. end of the needle, of course, the same extent to the east. The degrees of azimuth, reckoned on a parallel to the horizon at an altitude of 72° and more, being small, the deviation from the direction of the dipping needle, measured on the arc of a great circle, would be scarcely more than 1° towards the N. W.

Professor Bache stated that his own observations near Philadelphia, of the altitude of the apparent converging point of the auroral beams, at nine, P. M. made it but about 69°. He had witnessed a case of the appearance of a dark spot of irregular shape, between two beams of light, which was certainly not a cloud, as the stars were not at all obscured by it, and which he supposed to be the phenomenon referred to recently by Professor Lloyd. No mottled clouds, such as usually attend the aurora, were visible during the period between nine and ten o'clock, when he had been able to observe. Professor Bache stated that he did not place much stress upon his measurements, as he had been prevented from sustained observation by indisposition. There had been, in the newspapers, an account of an auroral display visible at London, on the morning of the fourth of September, at about the same absolute time as at Princeton, according to Professor Alexander's observations. It was said to have been accompanied by a very unusual number of shooting stars, compared in one statement to the splendid display of November 13th, 1833.

Professor Henry had examined the light of this aurora by the polariscopes of Savart and Arago, but had not been able to detect the slightest trace of polarization.

The following extract from a letter, addressed by Professor Henry, of Princeton, to Professor Bache, was read, announc-

ing the discovery of two distinct kinds of dynamic induction, by a galvanic current.

"Since the publication of my last paper, I have received through the kindness of Dr. Faraday, a copy of his fourteenth series of experimental researches; and in this I was surprised to find a statement directly in opposition to one of the principal results given in my paper. It is stated in substance, in the 59th paragraph of my last communication to the American Philosophical Society, that when a plate of metal is interposed between a galvanic current and a conductor, the secondary shock is neutralized. Dr. Faraday finds, on the contrary, under apparently the same circumstances, that no effect is produced by the interposition of the metal. As the fact mentioned forms a very important part of my paper, and is connected with nearly all the phenomena described subsequently to it, I was anxious to investigate the cause of the discrepancy between the results obtained by Dr. Faraday and those found by myself. My experiments were on such a scale, and the results so decided, that there could be no room for doubt as to their character; a secondary current of such intensity as to paralize the arms having been so neutralized, by the interposition of a plate and riband of metal, as not to be perceptible through the tongue. I was led by a little reflection to conclude that there might exist a case of induction similar to that of magnetism, in which no neutralization would take place; and I thought it possible that Dr. Faraday's results might have been derived from this. I have now, however, found a solution to the difficulty in the remarkable fact, that an electrical current from a galvanic battery exerts *two* distinct kinds of dynamic induction: one of these produces, by means of a helix of long wire, intense secondary shocks at the moment of breaking the contact, and feeble shocks at the moment of making the contact. This kind of induction is capable, also, of being neutralized by the interposition of a plate of metal between the two conductors. The other kind of induction is produced at the same time from the same arrangement, and does not give shocks, but affects the needle of the galvanometer; it is of equal energy at the moment of making contact, and of breaking contact, and is not affected by the introduction of a plate of copper or zinc between the conductors.* The phenomena produced by the first

* Since writing the account of the two kinds of induction, I have found that the second kind, although not screened by a plate of copper or zinc, is affected by the introduction of a plate of iron. In the cases of the first kind of induction, iron acts as any other metal.

kind of induction form the subject of my last paper as well as that of the one before; while it would appear from the arrangement of Dr. Faraday's experiments, that the results detailed in his first series, and those in the fourteenth, were principally produced by the second kind of induction. Although I may be too sanguine in reference to the results of this discovery, yet I cannot refrain from adding that it appears to lead to a separation of the electrical induction of a galvanic current from the magnetical, and that it is a step of some importance towards a more precise knowledge of the phenomena of magneto-electricity."

Dr. Bache announced the death of William Sullivan, Esq., late a member of the Society, and Dr. Hare was requested to prepare an obituary notice of the deceased.

The following gentlemen were duly elected members of the Society:—

Thomas U. Walter, of Philadelphia.
John Penington, of Philadelphia.
Eugene A. Vail, of Paris.
Charles Rümker, of Hamburgh.
Charles Gutzlaff, of Macao.
John Washington, Captain R. B. N.
Elias Loomis, of the Western Reserve College, Ohio.
Stephen Alexander, of Princeton College, N. J.